Foundation Day celebrations of NIPGR

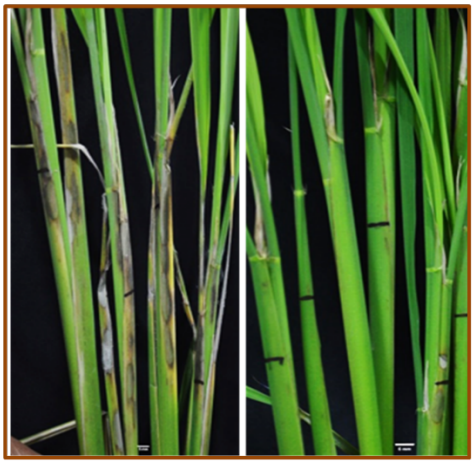
The National Institute of Plant Genome Research (NIPGR), New Delhi is an autonomous research institute under the Department of Biotechnology, Government of India. The NIPGR was established to conduct basic research in frontier areas of plant sciences and to seek applications thereof. The NIPGR is celebrating its 19th foundation day on November, 30, 2017. **Dr. Rajan Sankaranarayanan**, an outstanding scientist from CSIR-Centre for Cellular and Molecular Biology, Hyderabad has delivered the Foundation Day lecture entitled "Chirality based mechanisms during translation of the genetic code". This is a topic of fundamental importance for all living organisms and Dr. Sankaranarayanan has made novel discoveries in this field. **Dr. K. Vijay Raghavan**, Secretary, Department of Biotechnology, Govt. of India, addressed the gathering. Dr. Ramesh Sonti, Director, NIPGR highlighted the following as three major discoveries in basic research from the institute that have potential to provide societal benefit.

1. **A bacterium that eats fungal pathogens**: Fungal pathogens cause many devastating plant diseases that result in very significant crop losses. One of these pathogens, called *Rhizoctonia solani* (RS) causes the serious sheath blight disease of rice. Dr. Gopaljee Jha and his group have identified a bacterium that eats the RS fungus. Prior treatment of rice plants with this bacterium protects rice plants against the RS fungus (Figure 1). In a major breakthrough, their investigations have revealed that the bacterium uses a secreted protein to kill the pathogen. Purified preparations of this protein kill a wide range of fungi including many other plant pathogenic fungi as well as an important fungal pathogen of humans. This is an exciting discovery with potential for the use of this protein to control/treat fungal diseases of plants and humans. This research has been recently published in the prestigious journal Nature Communications.

2. **Development of Indian mustard lines with improved oil quality and feed values**: Indian mustard is an important oilseed crop that routinely finds its use as an oilseed, vegetable and oil-cake. Indian mustard cultivars contain relatively high amount of seed glucosinolates, which are known to be anti-nutritional and reduce meal palatability. The development of low-glucosinolate lines is therefore one of the major breeding objectives of the oilseed Brassicas. However, till date, no productive and agronomically viable low glucosinolate line has been reported in Indian mustard, as this trait requires presence of 6-7 different genes. Dr. Naveen Bisht and his group have identified an important mustard gene, which controls glucosinolate synthesis (figure 2). Reduction in expression of this single gene leads to reduced glucosinolate content in oil and oil- cake. Regulatory approvals for field testing of these lines are awaited.

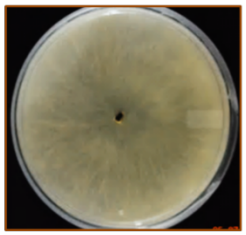
3. **Reducing phosphorus fertilizer use in rice production**: The yield advances of the green revolution have involved extensive use of chemical fertilizers, including inorganic phosphates. India imports substantial amounts of phosphorous fertilizers. Only a small proportion of the applied phosphorous is used by the crop while the rest ends up polluting water bodies. The use of organic manure is an important alternative for the use of chemical fertilizers. However, plants grown on organic manure have less biomass than those grown on inorganic phosphate. Dr. Jitender Giri and his group have identified a rice gene which when overexpressed allows more efficient use of organic manure (Figure 3). These genetically modified rice plants grow as well on organic manure as the unmodified plants on inorganic phosphate. This innovation has implications in reducing the use of chemical fertilizers, thus supporting sustainable intensification of agriculture.

Figure 1: Deciphering the secrets of a bacterium that eats fungi

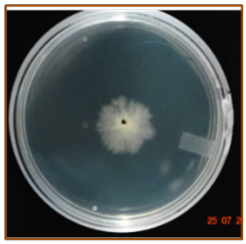


Pathogenic Fungus

Bacterium + Pathogenic Fungus



Fungus



Fungus and bacterial protein

Figure 2: Low glucosinolate mustard

Figure 3: A secreted rice protein that improves growth on organic manure

Normal **Modified plants**

Modified plants that overexpress the rice protein grow better on organic manure